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Signed J C Behan

Dated 30 July 2003

Patents Form 1/77

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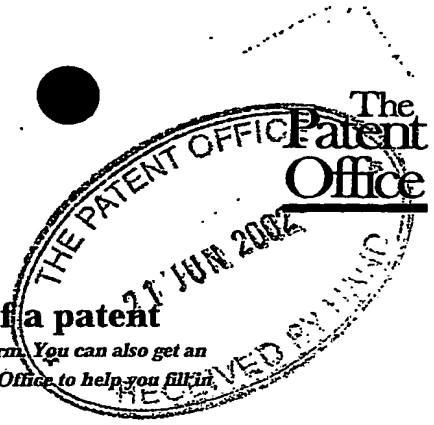

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P01/7700 0.00-0214405.3

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Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

The Patent Office

Cardiff Road
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NP9 1RH

1. Your reference — ABC/20758

2. Patent application number *(The Patent Office will fill in this part)* — 0214405.3 — 21 JUN 2002

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

   Bison Bede Limited

   Unit 9, No 1 Industrial Estate
   Consett
   Co Durham
   DH8 6ST
   United Kingdom

   Patents ADP number *(if you know it)* 8409054001

   If the applicant is a corporate body, give the country/state of its incorporation

4. Title of the invention — LIFT ASSEMBLY

5. Name of your agent *(if you have one)*

   "Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

   A A Thornton & Co
   235 High Holborn
   London
   WC1V 7LE

   75001

   Patents ADP number *(if you know it)*

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing *(day / month / year)*

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*

   a) any applicant named in part 3 is not an inventor, or
   b) there is an inventor who is not named as an applicant, or
   c) any named applicant is a corporate body.
   See note (d))

   YES

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form	
Description	6
Claim(s)	-
Abstract	-
Drawing(s)	3

10. If you are also filing any of the following, state how many against each item.

Priority documents	
Translations of priority documents	
Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	
Request for preliminary examination and search *(Patents Form 9/77)*	
Request for substantive examination *(Patents Form 10/77)*	
Any other documents *(please specify)*	

11. I/We request the grant of a patent on the basis of this application.

Signature

Date 21 June 2002

12. Name and daytime telephone number of person to contact in the United Kingdom: Andrew B Crawford - 020 7405 4044

Warning

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Notes

a) *If you need help to fill in this form or you have any questions, please contact the Patent Office on 0645 500505.*

b) *Write your answers in capital letters using black ink or you may type them.*

c) *If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.*

d) *If you have answered 'Yes' Patents Form 7/77 will need to be filed.*

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LIFT ASSEMBLY

The present invention relates to a lift assembly and more particularly to a modified method of control of the lift.

The preferred use of the present invention is as a stair lift, usually for persons but the lift assembly is of general use. Consequently, although the following description will refer to the assembly when used as a stair lift, it will be appreciated that this is one example of many uses to which the lift assembly can be put.

Stair lifts, for transporting people who have difficulty negotiating staircases from one floor to another, have been used for several years in buildings where such people reside. These stair lifts generally comprise a rail arrangement which runs along a staircase in a similar manner to a banister. They further comprise a chassis which runs along the rails which in turn supports a load bearing means generally comprising a seat. When the stair lift is in operation and the chassis and seat arrangement are running along the rails, it is very important that the seat arrangement moves as smoothly as possible, and that it is kept in a horizontal orientation. This ensures that the person being transported, who will frequency be frail and sensitive to sudden movements, is not injured.

In many residential buildings, the stair lift will travel along a substantially straight inclined rail, or a curved rail of fixed gradient from one level to another. No seat orientation mechanism will hence be necessary as the chassis and seat can be fixed together in a predetermined orientation having regard to the gradient. However, it is also common for staircases to comprise two or more flights, often of different gradients and frequently with horizontal rail sections, as corners are turned and level floor sections are negotiated. When stair lifts are required to have rails with sections which vary in gradient, it is customary to have some mechanism

so that the seat always remains horizontal when the rail gradient varies. Previously, there have been a number of proposals for utilising purely mechanical levelling of the seat. One such arrangement utilised a pair of rails which are fixed in position but whose vertical separation changed depending on the gradient. The seat is attached to the rails by means of bogies running on the rails and the arrangement is such that as the seat assembly is driven along the rails, the change in rail separation causes the seat to remain horizontal.

It is an object of the present invention to provide a stair lift in which the seat is fixed with respect to the chassis but the chassis itself is arranged to change its orientation with respect to the rail in order to maintain the seat horizontal.

In order that the present invention be more readily understood, an embodiment thereof will now be described by way of example with reference to the accompanying drawings in which:-

Fig 1 shows diagrammatically the general layout of a stair lift according to the present invention;

Fig 2 shows a side view of the chassis in a first orientation with respect to a rail; and

Fig 3 shows a side view of the chassis in a further orientation.

In general, a stair lift comprises a rail provided with a rack along which a powered chassis is arranged to move. A seat is attached to the chassis. The rail can take any one of a number of forms but at present we prefer to utilise a rail having a relatively complex cross-sectional shape with one or more flat surfaces which are generally normal to an upright section and one of which forms the running surface for the chassis. The rail has a constant cross-section throughout its length so that load bearing surfaces of the rail remain parallel.

For all but the simplest straight lifts, it is necessary to ensure that the seat remains horizontal throughout its travel and this is particularly true when the

gradient of the rail changes which can for example occur when the lift crosses a landing or half landing. Until now, it has been assumed that the chassis should remain in a fixed orientation with respect to the rail at all times and this in the past has meant that it is necessary to pivotally mount the seat on the chassis and then control the orientation of the seat with respect to the chassis as it travels along the length of the rail.

The present invention proposes to maintain the seat level in a radically different fashion to that which has previously been the norm. In the present embodiment, the seat is fixed to a chassis member which is attached to the rail in such a manner that the orientation of the chassis member can be altered with respect to the rail in order to maintain any desired orientation with respect to the horizontal.

Turning now to the drawings, Fig 1 shows a general layout diagram of a chassis but without the normal rail and other parts being present in the diagram. This is done for clarity reasons. The chassis comprises a main member 10 which in this embodiment is a simple upright plate. A seat (not shown) is arranged to be fixedly attached to the main member 10 at a suitable location so that a foot rest attached to the seat will be located on one side of the member 10. On the other side of the member 10 are mounted two assemblies 11 and 12 which are arranged to be in engagement with the rail. It is usually preferred that the assemblies 11 and 12 are on one side of the rail with the foot rest on the other side as this helps to balance the moving seat assembly. The assembly 11 comprises a drive assembly which includes a pinion 15 for engagement with the normal rack 39 (Fig 2) on the stair lift rail, and a drive motor 14, in this case an electric motor, for the pinion. Lateral guides 20 in the form of a pair of rollers 17 (see Fig 2) only one of which is shown, are provided to ensure that the assembly 11, and the chassis connected

thereto, remain upright. One roller of the pair is disposed on a respective side of the rail.

The other assembly 12 is a levelling assembly and comprises an elongated slideway 13 provided with a slidable member 18 having a roller 18a for engagement with a running surface 40 (Fig 2) of the rail. The assembly 11 is moved towards and away from the rail in a vertical direction by means of a drive mechanism 16 connected to the slidable member 14. Lateral guiding means 21 are also provided in order to maintain the member 10 upright and these will be explained in more detail later.

The chassis is provided with a sensor 19 for sensing the inclination of the main member 10 with respect to the vertical and the sensor 19 is arranged to send an error signal to a control system (not shown) which in turn controls operation of the drive means 16 which causes the slide member 18 to move in the slideway with respect to the assembly housing 12 and which in turn causes the chassis main member 10 to change its orientation with respect to the rail.

It should be noted that the assemblies 11 and 12 are mounted to the chassis main member 10 so that they are each pivotal about their own respective vertical axes A and B. Otherwise, the assemblies are fixed to the chassis main member. The pivoting of the assemblies is a desirable feature but it may be possible to dispense with one or both of the pivots in certain constructions.

Turning now to Fig 2, this shows, to an enlarged scale, a side view of the two assemblies 11 and 12 when they are in position on a horizontal section of the rail. The same reference numerals are utilised for the same parts as in Fig 1 and consequently a detailed description of Fig 2 will not be given. However, it should be noted that when the rail is horizontal, the slide member 18 which carries the roller 18a is located close to the top of the slideway 13 which forms part of assembly 12. It should also be noted that the lateral guiding means 21 includes

lateral guide rollers 23 and 24 for the assembly 12 and are linked to the slide 14 so that the angle of their axes of rotation can be altered. Because the rollers 23 and 24 are disposed at different heights, it is necessary to alter the angle of their respective axes of rotation by different amounts. This is achieved by means of two linkages 25 and 26 respectively, which are preferably interlinked.

The operation of the linkages 25 and 26 and also the orientation of the lateral rollers 23 and 24 will be seen more clearly by comparing Figs 2 and 3. Fig 3 shows the position of the slide way when on a steeply inclined rail section where the slide member 18 is at or near the bottom of the slideway 13.

Roller 23 is located on one side of the rail and is mounted for rotation about axis 23a. As the slide moves along the slideway 13, it is necessary to change the orientation of the axis 30a in order to reduce frictional effects and this is achieved by means of the simple linked arms 25a and 25b. On the other hand, roller 24 is located on the other side of the rail from the roller 23 and is mounted for rotation about an axis 24a. In order to modify the orientation of the axis of rotation 24a, the linkage is formed by a bell crank lever pivoted at the end 26a to the slide member 18 and where free end 26b is pivoted with a cam member for engagement with a cam surface 32 fixed to the slideway 13. The bearings for the roller 24 are connected to the lever at point 26e.

Various modifications can be made to the above embodiment. For example, the drive arrangement for the slide member 18 is preferred to be a worm drive but could equally be a ball screw arrangement. It is also possible to utilise piston and cylinder devices. Also, additional or alternative guide roller arrangements can be utilised in order to laterally stabilise the chassis.

It is to be particularly noted that the drive assembly does not have a roller corresponding to the main roller of the assembly 12, in other words there is no roller on the drive arrangement 11 which rides on the same surface as does the

main roller of the assembly 12. This means that the chassis is arranged to be mounted for movement on the pinion 15 and the main roller. The pinion 15 then has a load bearing as well as driving function.

It is possible for the drive assembly 11 to be fitted with a separate load supporting roller but if this is the case then we prefer to have a roller mounted on the same centre as the drive pinion as this avoids potential problems due to jamming as the angle between the assembly 12 and the rail alters. It is also desirable to provide a further lateral stabilising roller on the other side of the rail from the drive pinion to ensure that the drive pinion does not disengage from the rack.

Further, the drive assembly 11 is seen as being disposed on the "uphill" side of the chassis member but this need not be the case. However, rather than the levelling assembly 12 extending in order to keep the chassis level, it would have to contract or else be fitted below the running surface of the rail.

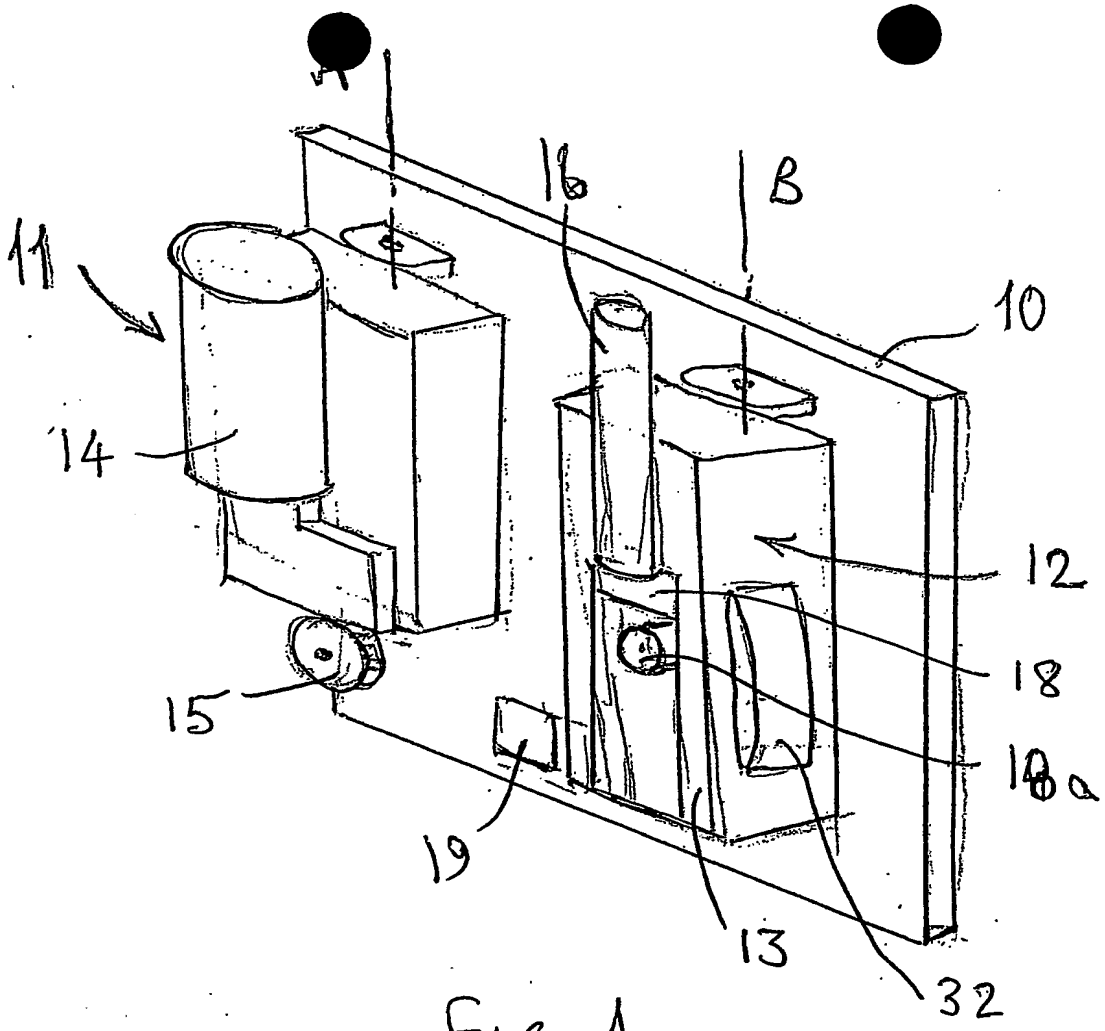

FIG. 1.

FIG 2

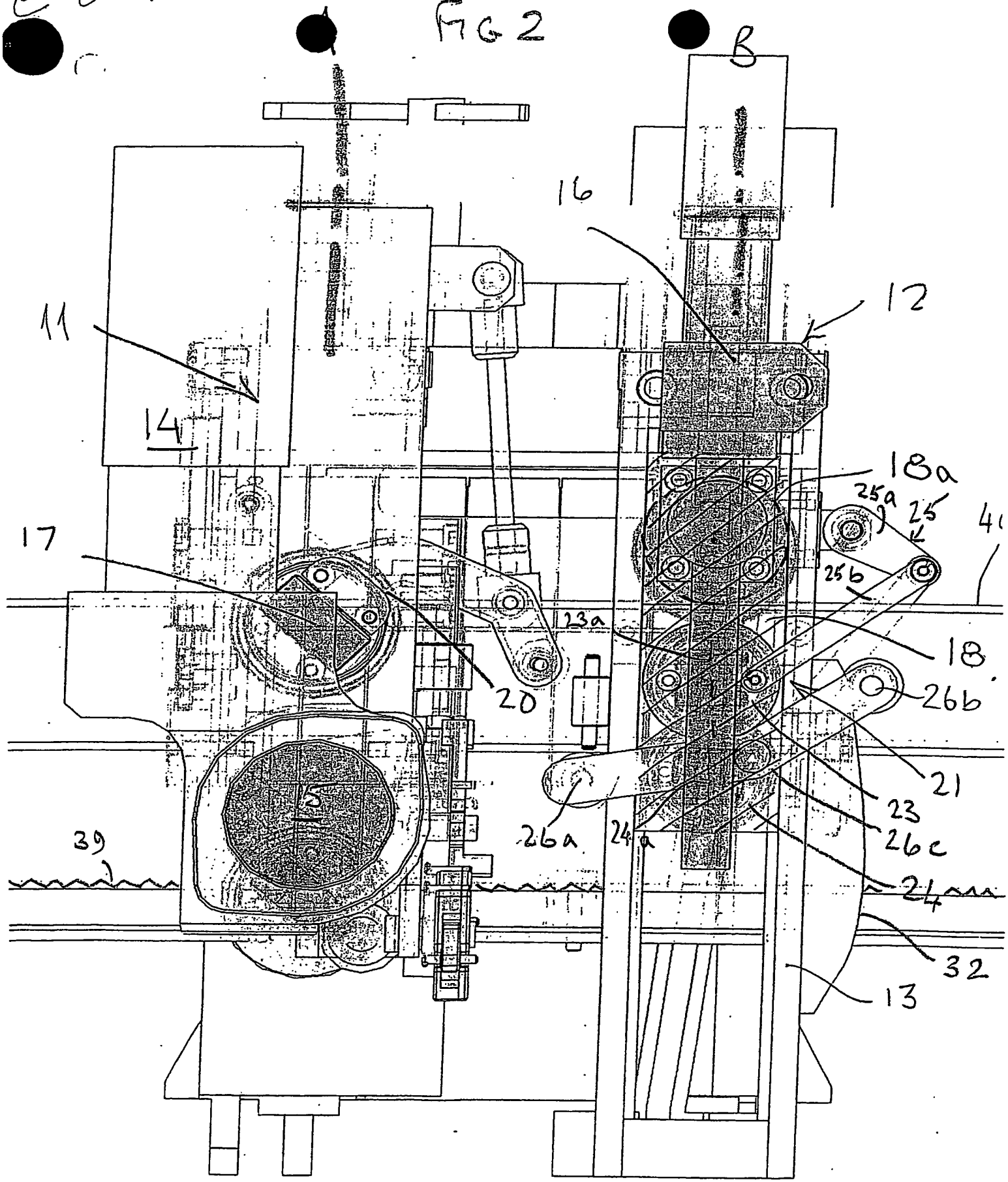
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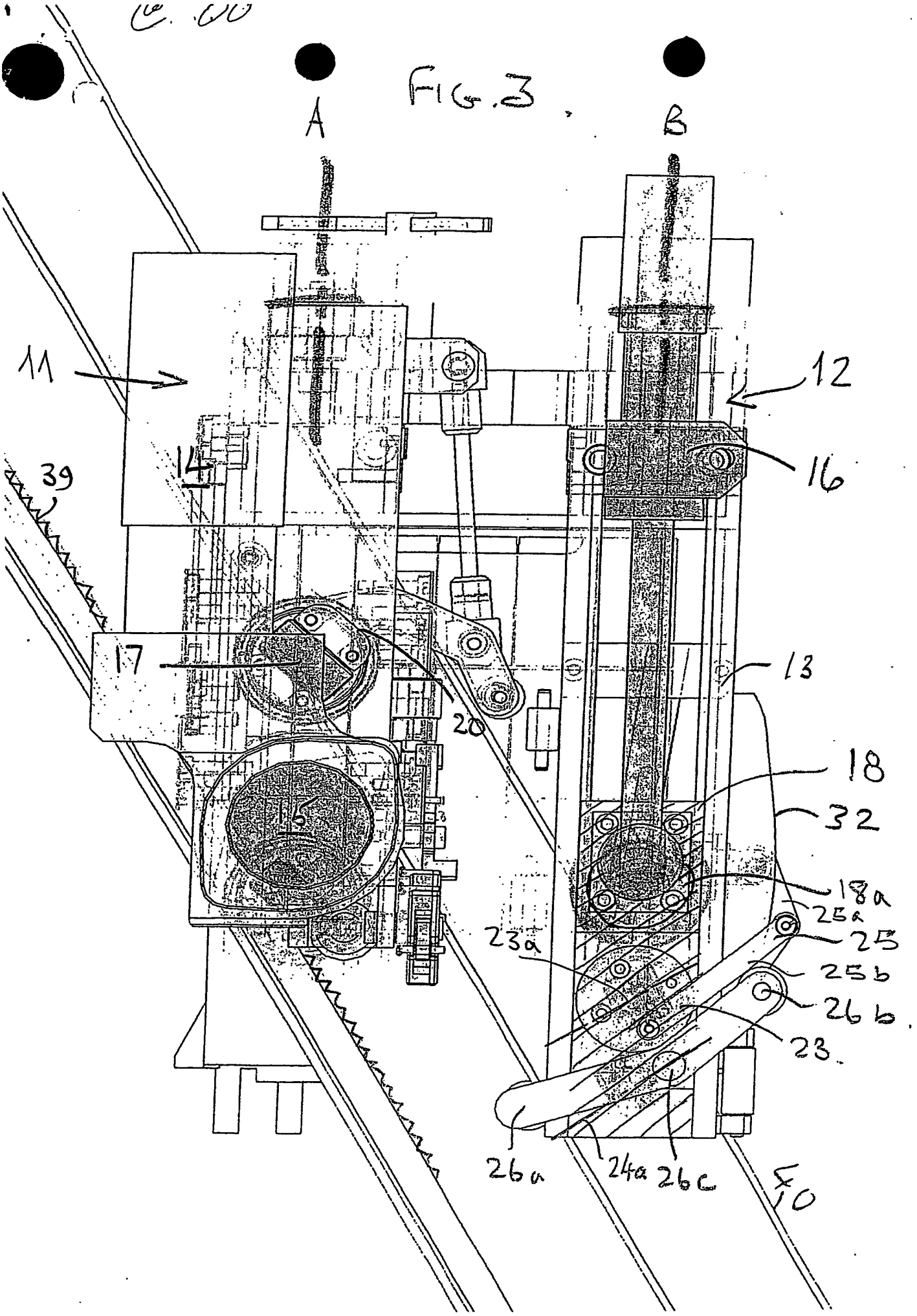
FIG.3.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